URS Greiner Woodward Clyde

Page ____ of ____

Job _____ Project No. _____ Sheet ____ of ____

Description _____ Computed by _____ Date _____

_____ Checked by _____ Date _____

		Reference
Steve Bryant	TechLaw Inc.	913-236-0006
Sandy Olinger	AMEC	256 313-1718
Heather Black	Titan	256-313-1710
Bob Skack	URS	913-344-1158
Mike Mason	URS	913-344-1034
Matt Phoenix	URS	913-344-1085
Jim Harris	MDNR	573 526-2736
Brad Eaton	USACE	816 983-3861
Jerry Preston	HQDA BRAC-Versar	404-464-6375
Tom Lorenz	USEPA	913-551-7292

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MG421002122
4-1
SRC NID

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CONTINGENCY SAMPLING PLAN

SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY - ST. LOUIS ARMY AMMUNITION PLANT

The basis for this sampling plan is as follows:

- Soil borings to characterize sewer breaches will be installed within approximately 25 ft of each breach location where contaminants were detected in the sewer sediment or water samples immediately upstream of the breach. The relatively high hydraulic conductivity of the granular bedding material around the sewer lines, compared to the surrounding clays, would tend to transport contaminants away from the breach making closer sample intervals unnecessary.
- Beryllium detections above the screening level were observed in several locations across the site, typically in native clays deeper than 10 ft. below ground surface (bgs). Anecdotal evidence suggests that beryllium may be a naturally occurring constituent of the clay and not a site-related contaminant, therefore contingency samples are not recommended to address this contaminant. Also there is no exposure route in deep soils, making additional data unnecessary for the SSEBS or Risk Assessment.
- Copper was detected in one sample above the screening level at 0-0.5 ft. bgs in the parking area west of Building 1outside the former billet storage yard. Since process knowledge does not indicate that metals were stored outside the yard, and the other samples from this boring and surrounding borings were well below the screening levels, further sampling is not recommended.
- Based on the investigation results and the Field Sampling Plan, the following additional contingency samples are recommended:

Sewers

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- 10 Geoprobe borings (average 25-ft. depth)
  - 30 Samples for VOC, SVOC, PCB, Metals and TPH-DRO analysis
- 5 Sediment samples to determine presence of Dioxin in sewer system (all locations previously sampled and in close proximity to Building 2)
  - 5 Samples for PCB and Dioxin analysis

Railroads

- 4 Geoprobe borings (1-ft. depth) to identify extent of 1,1-DCE at RA-RRSB-10
  - 4 Samples for VOC analysis

Roadways

- 3 Geoprobe borings (1-ft. depth) to identify extent of antimony at RA-RDSB-16E
  - 3 Samples for Metals analysis
- 2 Geoprobe borings (10-ft. depth) to identify extent of 1,1-DCE at RA-RDSB-01E
  - 2 Samples for VOC analysis

Building 1

- 3 Geoprobe borings (1-ft. depth) to identify extent of PCB at 01-SB10 Shallow
  - 3 Samples for PCB analysis

Building 2

- 10 Geoprobe borings (10-ft. depth) to identify extent of PCB/Dioxin around building
  - 30 Samples for PCB and Dioxin analysis

Building 4

- 2 Hand Auger borings (3-ft. depth) to investigate PCBs below concrete samples 04CS-02 and 04CS-03
  - 4 Samples for PCB analysis

Building 6

- 1 Hand Auger boring (5-ft. depth) to determine depth of Mercury and Pesticides at RA-06SB-04
  - 1 Sample for Metals and Pesticide analysis

Building 7

- 1 boring co-located with sewer boring (1-ft. depth) to identify extent of PCB at RA-07SB-02
  - 1 Sample for PCB analysis

Building 8

- 1 Geoprobe boring (1-ft. depth) to identify extent of 1,1-DCE at RA-08SB-05
  - 1 Sample for VOC analysis
- 2 Geoprobe borings (12-ft. depth) to identify extent of TPH at 08SB-07
  - 2 Samples for TPH-DRO analysis

Building 10

- 4 Geoprobe borings (20-ft. depth) to identify extent of TPH around former underground storage tanks (originally detected in SRSB-18 and SRSB-19)
- 4 Geoprobe borings (12-ft. depth) to identify extent of TPH at SRSB-16
  - 8 Samples for TPH-DRO analysis

No Additional Sampling

- Building 3
- Building 5
- Northeast Parking Area
- Groundwater

Totals

43 Geoprobe borings
3 Hand Auger borings

Analyses

35 Dioxin
34 Metals
1 Pesticide
73 PCB
30 SVOC
40 TPH-DRO
37 VOC

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CONTINGENCY SAMPLING PLAN

SITE SPECIFIC ENVIRONMENTAL BASELINE SURVEY - ST. LOUIS ARMY AMMUNITION PLANT

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  - 30 Samples for VOC, SVOC, PCB, Metals and TPH-DRO analysis
- 5 Sediment samples to determine presence of Dioxin in sewer system (all locations previously sampled and in close proximity to Building 2)
  - 5 Samples for PCB and Dioxin analysis

Railroads

- 4 Geoprobe borings (1-ft. depth) to identify extent of 1,1-DCE at RA-RRSB-10
  - 4 Samples for VOC analysis

Roadways

- 3 Geoprobe borings (1-ft. depth) to identify extent of antimony at RA-RDSB-16E
  - 3 Samples for Metals analysis
- 2 Geoprobe borings (10-ft. depth) to identify extent of 1,1-DCE at RA-RDSB-01E
  - 2 Samples for VOC analysis

Building 1

- 3 Geoprobe borings (1-ft. depth) to identify extent of PCB at 01-SB10 Shallow
  - 3 Samples for PCB analysis

Building 2

- 10 Geoprobe borings (10-ft. depth) to identify extent of PCB/Dioxin around building
  - 30 Samples for PCB and Dioxin analysis

Building 4

- 2 Hand Auger borings (3-ft. depth) to investigate PCBs below concrete samples 04CS-02 and 04CS-03
  - 4 Samples for PCB analysis

Building 6

- 1 Hand Auger boring (5-ft. depth) to determine depth of Mercury and Pesticides at RA-06SB-04
  - 1 Sample for Metals and Pesticide analysis

Building 7

- 1 boring co-located with sewer boring (1-ft. depth) to identify extent of PCB at RA-07SB-02
  - 1 Sample for PCB analysis

Building 8

- 1 Geoprobe boring (1-ft. depth) to identify extent of 1,1-DCE at RA-08SB-05
  - 1 Sample for VOC analysis
- 2 Geoprobe borings (12-ft. depth) to identify extent of TPH at 08SB-07
  - 2 Samples for TPH-DRO analysis

Building 10

- 4 Geoprobe borings (20-ft. depth) to identify extent of TPH around former underground storage tanks (originally detected in SRSB-18 and SRSB-19)
- 4 Geoprobe borings (12-ft. depth) to identify extent of TPH at SRSB-16
  - 8 Samples for TPH-DRO analysis

No Additional Sampling

- Building 3
- Building 5
- Northeast Parking Area
- Groundwater

Totals

43 Geoprobe borings
3 Hand Auger borings

Analyses

35 Dioxin
34 Metals
1 Pesticide
73 PCB
30 SVOC
40 TPH-DRO
37 VOC

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Agenda - January 15, 2003

0800 - 0830 Introductions / Begin Meeting
0830 - 1000 Preliminary Review of SSEBS Findings
1000 - 1015 Break
1015 - 1200 Introduce and Discuss Proposed Contingency Sampling Plan
1200 - 1300 Lunch
1300 - 1600 Discuss and Finalize Contingency Sampling Plan
1600 - 1700 Develop Schedule for Contingency Sampling and Final Report Timetable

ST. LOUIS ARMY AMMUNITION PLANT

SITE-SPECIFIC ENVIRONMENTAL BASELINE SURVEY

Preliminary Review of SSEBS Findings

Outline

- Site History
- Review of Environmental Baseline Survey (EBS) Report (December, 2000) and Development of Site-Specific EBS (SSEBS) Work Plan
- SSEBS Field Investigation
- Results of SSEBS Field Investigation
- Baseline Human Health Risk Assessment (HHRA)

Site History

- 1941: Begin St. Louis Ordnance Plant (SLOP) small arms production
- 1944: Conversion to 105 mm Howitzer shell production, designated as St. Louis Army Ammunition Plant (SLAAP)
- 1984: Renovated office space
- 1989: Industrial equipment removed
- 1998: Site vacant
- 2002: Demolition of Building 3

Review of Environmental Baseline Survey (EBS) Report (December, 2000) and Development of Site-Specific EBS (SSEBS) Work Plan

Sampling Activities

- Installation/sampling of 9 monitoring wells
- Asbestos Containing Material (ACM) survey
- 34 soil borings
- 49 wipe samples
- 21 sediment/surface soil samples
- 4 wastewater/sump samples
- 24 concrete samples

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Areas Requiring Further Investigation

- Site Wide
  - Sewer System
  - Underground Storage Tank (UST) areas
  - Transformer areas
  - Metal storage areas
  - Sumps
  - Groundwater

Areas Requiring Further Investigation (cont.)

- Building 1
  - Sumps (PCBs, Metals)
  - PCB oil stain
  - Metals in storage yard soils
  - Soils near breaking machines (PCBs, Metals)
  - Soils under building (TPH, PCBs, VOCs)

Areas Requiring Further Investigation (cont.)

- Building 2
  - PCBs near former hydraulic fluid storage areas
  - Soils beneath building (TPH, SVOCs, PCBs, VOCs)
  - Sediment in manholes (VOCs)
  - Dioxin sampling at locations with PCB detections in high-heat areas

Areas Requiring Further Investigation (cont.)

- Building 4
  - PCB oil stain
  - Sumps and compressor pits (PCBs)
- Building 5
  - Elevator (PCBs)
  - Storage area south of building (TPH)

Areas Requiring Further Investigation (cont.)

- Building 6
  - Lab and Darkroom (Metals)
  - Storage area south of building (TPH)
  - PCBs on basement surfaces
- Building 7
  - Oil stain (TPH)
  - Cooling Tower Blowdown Sediments (Cr^{+6})

Areas Requiring Further Investigation (cont.)

- Building 8
  - SVOCs in soil
  - Pipe trench leading to Building 2 (TPH)
- Building 9
  - Explosives in soil
- Building 10
  - UST closure not completed

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Site-Specific EBS (SSEBS) Work Plan

- Address areas identified as requiring additional investigation
- Collect unbiased data for a Baseline Human Health Risk Assessment (HHRA)
- Phased approach to sample collection
  - Initial round of primary samples
  - Subsequent round of contingency samples to further define extent of contamination

Site-Specific EBS (SSEBS) Work Plan (cont.)

- Establish Screening Levels (SLs) for Chemicals of Concern at the Site
  - Selection of SLs that ensures data that supports assessment of risk and allows flexibility in the decision making process
    - EPA Region IX Residential Preliminary Remediation Goals (PRGs)
    - Cleanup Levels for Missouri (CALM) - Scenario A (Residential)
    - Background levels determined for Metals and PAHs

SSEBS Field Investigation

- Field work conducted from August 12 - September 20, 2002
- Most primary samples collected as planned except the following notable exceptions
  - Sewer system-
    - Sediment and Wastewater not found at all projected sampling locations - reduced number of samples
    - Sewers located very deep in areas, bedrock encountered prior to third sample depth

SSEBS Field Investigation (cont.)

- (Exceptions continued)
  - Building 1
    - Only one sump observed in SW corner, sample 01SB-09 eliminated
    - Obstruction encountered after collecting shallow and middle samples, offset to collect deep sample
  - Building 2
    - Concrete and Product samples not in Work Plan added for PCB analysis

SSEBS Field Investigation (cont.)

- (Exceptions continued)
  - Building 6
    - Wall in basement prevented access to sample locations RA-06SB-08 and RA-06SB-16, samples were not collected
  - Building 7
    - No Sediments observed beneath Cooling Tower, sample not collected
    - Piping and concrete between Cooling Tower and Pump House obstructed sampling equipment, deeper samples at RA-07SB-10 not collected

SSEBS Field Investigation (cont.)

- (Exceptions continued)
  - Groundwater
    - Chloride and Fluoride analyses added to three of the new wells located near Fire Hydrant (also sampled for these new parameters)
    - Additional soil boring (08SB-MW02) sampled near monitoring well 08MW-02 due to odor encountered during installation of well

Results of SSEBS Field Investigation

- Regional Background
- Building 1
- Building 2
- Building 4
- Building 5
- Building 6
- Building 7
- Building 8
- Building 10
- Northeast Parking Area
- Railroads
- Roadways
- Sewer System
- Groundwater

Regional Background - Metals

Parameter	Minimum Detection	Maximum Detection	95% Upper Tolerance Limit
Antimony	nd	nd	na
Arsenic	3.4	18	21.4
Barium	154	376	679
Beryllium	0.57	1.4	1.6
Cadmium	1.9	6.3	7.1
Chromium	14	43	48.3
Copper	17	348	404
Lead	34	876	1038
Mercury	0.025	0.35	0.44
Nickel	13	40	45.7
Selenium	3.3	10	16.5
Silver	nd	nd	na
Thallium	0.17	0.44	0.53
Zinc	60	902	1068

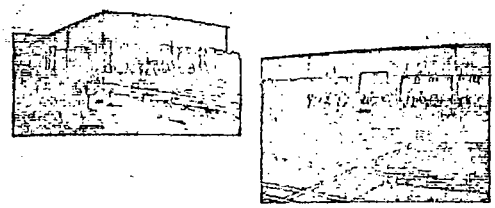
Note: All results in mg/kg
na - not applicable
nd - not detected

Regional Background - PAHs

Parameter	Minimum Detection	Maximum Detection	95% Upper Tolerance Limit
Acenaphthene	0.001	0.93	1.1
Acenaphthylene	0.001	0.165	0.31
Anthracene	0.004	2.4	2.8
Benzo(a)anthracene	0.003	6.2	7.2
Benzo(a)pyrene	0.003	3.5	4.1
Benzo(b)fluoranthene	0.006	4.2	4.9
Benzo(g,h,i)perylene	0.023	2.1	2.5
Benzo(k)fluoranthene	0.002	2.1	2.5
Chrysene	0.005	6	7.0
Dibenz(a,h)anthracene	0.013	1.3	1.5
Fluoranthene	0.008	13	15.2
Fluorene	0.001	1	1.2
Indeno(1,2,3-cd)pyrene	0.022	1.7	2.0
Naphthalene	0.002	0.165	0.37
Phenanthrene	0.003	13	15.2
Pyrene	0.008	11	12.8

Note: All results in mg/kg

Building 1



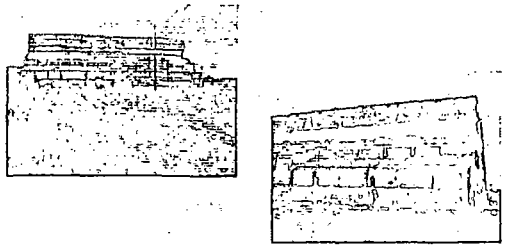
Building 1 Summary Table

Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level				
		Metals	PAHs	PCBs	TPH	VOCs
Concrete	2	na	na	1	na	na
Soil – Equipment Sumps	6	na	na	0	0	na
Soil – Billet Entry Points	9	0	na	na	na	na
Soil – Billet Entry Points	3	na	0	0	0	0
Soil – SW Sump	3	na	na	0	na	na
Soil – Process Sumps	9	0	na	1	0	na
Soil – Billet Storage Yards	18	0	na	na	na	na
Soil – Risk Assessment	30	1	0	0	na	0

Building 1 Results

- Concrete
  - Samples collected at 0-1" and 2-3" depths from one location
  - PCB-1254 detected at concentration of 0.43J mg/kg in 0-1" sample (Soil Screening Level (SL) = 0.22 mg/kg)
- Soil
  - SE Process Sump sample 01SB-10(0-0.5) had detection of PCB-1254 at a concentration of 0.35 mg/kg (SL = 0.22 mg/kg)
  - Risk Assessment sample RA-01SB-03(0-0.5) had detection of Copper at 1260 mg/kg (SL = 1100 mg/kg)

Building 2



Building 2

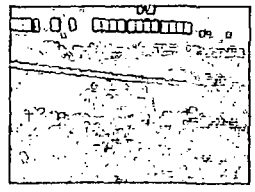
Building 2 Summary Table

Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level						
		Asbestos	Dioxin	Metals	PAHs	PCBs	TPH	VOCs
Asbestos	20	0	na	na	na	na	na	na
Concrete	10	na	na	na	na	9	na	na
Product	2	na	na	na	na	1	na	na
Surface Wipe	1	na	na	na	na	1*	na	na
Soil – Equipment Areas	12	na	7	na	na	1	3	na
Soil – Central Trench	15	na	5	na	na	0	na	na
Soil – Test Pits	20	na	11	0	na	3	4	0
Soil – Risk Assessment	36	na	13	0	0	1	na	1

* No Screening Level for Surface Wipe Sample

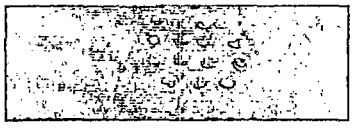
Building 2 Results

- Refractory Bricks
  - 2 types of refractory bricks were sampled
  - 10 samples of each
  - All samples were determined to be non-asbestos containing



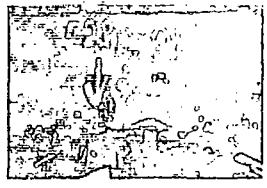
Building 2 Results (cont.)

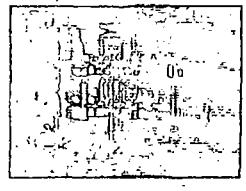
- Concrete
  - All samples collected from 0-1" depth only
  - PCB-1248 detected in 9 samples at concentrations ranging from 0.41J to 9.6 mg/kg (Soil SL = 0.22 mg/kg)
  - PCB-1260 detected in 3 samples at concentrations ranging from 0.09J to 0.6 mg/kg (Soil SL = 0.22 mg/kg)



Building 2 Results (cont.)

- Product
  - PCB-1248 detected at concentration of 10 mg/kg (Soil SL = 0.22 mg/kg) in 02PD-01 in SE corner of building
  - No PCBs detected in 02PD-02 from West Mezzanine





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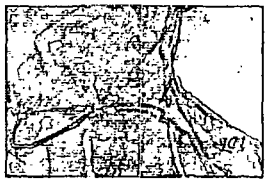
Building 2 Results (cont.)

- Surface Wipes
  - Sample was collected from oil-coated wires in a trench
  - PCB-1248 was detected (No Screening Level)



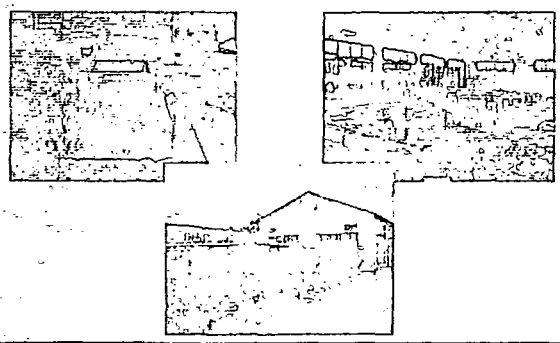
Building 2 Results (cont.)

- Soils
  - Dioxins
    - 36 Detections above Screening Level (TEQ SL = 2,3,7,8-TCDD EPA Region IX PRG = 3.9 pg/g)
      - 0 - 1 feet: 8 Detections above TEQ SL
      - 2 - 5 feet: 8 Detections above TEQ SL
      - 6 - 10 feet: 14 Detections above TEQ SL
      - 11 - 15 feet: 4 Detections above TEQ SL
      - >15 feet: 2 Detections above TEQ SL
    - Min = 3.917 pg/g; Mean = 52.60 pg/g; Max = 313.8 pg/g

Building 2 Results (cont.)

- Soils (cont.)
  - PCBs
    - 5 Detections of PCB-1248 above Screening Level (SL = 0.22 mg/kg)
    - *Min = 1 mg/kg; Mean = 5 mg/kg; Max = 14 mg/kg*
  - TPH
    - 7 Detections of TPH above Screening Level (SL = 200 mg/kg)
    - Min = 250 mg/kg; Mean = 1,675 mg/kg; Max = 3,603 mg/kg
  - VOC
    - 1,1-Dichloroethene detected at concentration of 0.11 mg/kg (SL = 0.054 mg/kg) at boring location RA-02SB-12 at a depth of 9 to 10 feet

Building 4



Building 4 Summary Table

Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level					
		Metals	PAHs	PCBs	Pesticides	TPH	VOCs
Concrete	4	na	na	2	na	na	na
Surface Wipe	4	na	na	0	na	na	na
Soil – PCB Stain	3	na	na	0	na	na	na
Soil – Compressor Pits	6	na	na	0	na	0	na
Soil – Risk Assessment	28	1	0	0	0	na	0

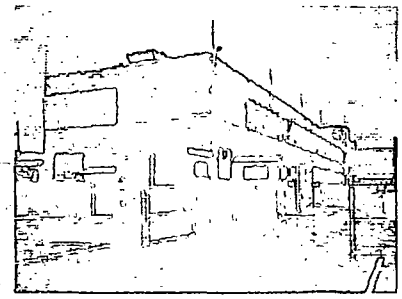
Building 4 Results

- Concrete
  - Samples collected at 0-1" and 2-3" depths from one location (04CS-01) and only 0-1" at two other locations
  - PCB-1248 detected at concentrations of 0.97 and 1.2 mg/kg in surface samples at 04CS-02 and 04CS-03 (Soil SL = 0.22 mg/kg)
- Surface Wipes
  - No detections above the Screening Levels for PCBs

Building 4 Results (cont.)

- Soils
  - No detections above Screening Levels for PAHs, PCBs, Pesticides, TPH or VOCs
  - One detection of Metals above Screening Level, Beryllium at RA-04SB-02
    - Depth was 2 to 3'
    - Concentration was 1.9 mg/kg
    - Screening Level = 1.6 mg/kg

Building 5



Building 5 Summary Table

Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level						
		Explosives	Metals	PAHs	PCBs	Pesticides	TPH	VOCs
Mastic	3	na	na	na	3*	na	na	na
Surface Wipe	1	na	na	na	0	na	na	na
Soil – Oil Storage Pad	3	na	na	0	na	na	0	na
Soil – Risk Assessment	32	0	1	1	0	1	na	0

* No Screening Level for Mastic Samples

Building 5 Results

- Mastic
  - All 3 samples had detections for PCBs
  - PCB-1248: 0.41 - 1.5 mg/kg
  - PCB-1254: 0.22 - 3.1 mg/kg
- Surface Wipe
  - No detections above the Screening Limit for PCBs

Building 5 Results (cont.)

- Soil Borings
  - *Oil Storage Pad - no detections above the Screening Level for PAHs or TPH*
  - Risk Assessment Locations
    - Only detections above Screening Level were at location RA-05SB-05, shallow depth of 0-6 inches
    - Metals
      - Lead detected at concentration of 1790 mg/kg (SL = 1039)

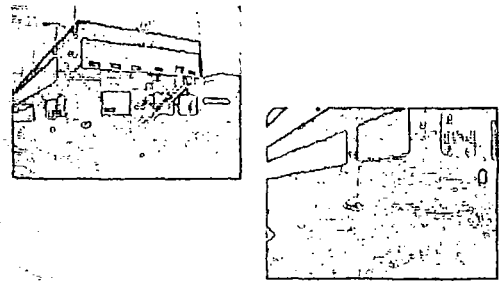
Building 5 Results (cont.)

- Soil Borings
  - Risk Assessment Locations (cont.)
    - PAHs detected above Screening Level
      - Benzo(a)anthracene - 25 mg/kg (SL = 7.2 mg/kg)
      - Benzo(a)pyrene - 19 mg/kg (SL = 4.1 mg/kg)
      - Benzo(b)fluoranthene - 16 mg/kg (SL = 4.9 mg/kg)
      - Benzo(g,h,i)perylene - 14 mg/kg (SL = 2.5 mg/kg)
      - Benzo(k)fluoranthene - 19 mg/kg (SL = 6.2 mg/kg)
      - Dibenz(a,h)anthracene - 7.1 mg/kg (SL = 1.5 mg/kg)
      - Indeno(1,2,3-cd)pyrene - 11 mg/kg (SL = 2.0 mg/kg)
      - Phenanthrene - 33 mg/kg (SL = 15.2 mg/kg)

Building 5 Results (cont.)

- Soil Borings
  - Risk Assessment Locations (cont.)
    - Pesticides detected above Screening Level
      - 4,4'-DDE at concentration of 65 mg/kg (SL = 1.7 mg/kg)
      - 4,4'-DDT at concentration of 1,100 mg/kg (SL = 1.7)

Building 6



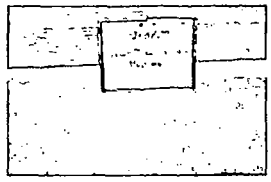
Building 6 Summary Table

Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level							
		Explosives	Metals	PAHs	PCBs	Pesticides	SVOCs	TPH	VOCs
Mastic	3	na	na	na	3*	na	na	na	na
Sediment	1	na	1	na	na	na	0	na	0
Surface Wipe	1	na	0	na	na	na	0	na	0
Surface Wipe	4	na	na	na	0	na	na	na	na
Soil – Oil Storage Pad	3	na	na	0	na	na	na	0	na
Soil – Risk Assessment	28	0	5	0	0	2	na	na	0

* No Screening Level for Mastic Samples

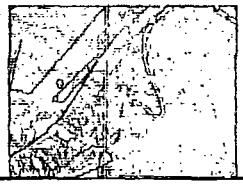
Building 6 Results

- Mastic
  - All 3 samples had detections for PCBs
  - PCB-1248: 1.2 to 4.9 mg/kg
  - PCB-1254: 0.73 to 10 mg/kg



Building 6 Results

- Sediment
  - Taken in Old HVAC System Duct
  - Metals detected above Screening Levels
    - Arsenic at concentration of 23 mg/kg (Soil SL = 21.4 mg/kg)
    - Chromium at concentration of 222 mg/kg (Soil SL = 210 mg/kg)
    - Lead at concentration of 2610 mg/kg (Soil SL = 1038 mg/kg)
    - Mercury at concentration of 3.6 mg/kg (Soil SL = 0.6 mg/kg)



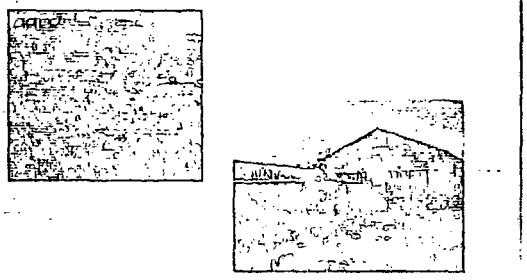
Building 6 Results (cont.)

- Surface Wipes
  - All detections below Screening Levels
- Soils
  - Oil Storage Pad - no detections above the Screening Levels for PAHs or TPH
- Risk Assessment Borings
  - 4,4' DDT detected above Screening Level (1.7 mg/kg) at RA-06SB-04
    - 4 mg/kg at depth of 0 to 1/2 foot
    - 21 mg/kg at depth of 2 to 3 feet

Building 6 Results (cont.)

- Risk Assessment Borings (cont.)
  - Beryllium and Mercury detected above Screening Levels (1.6 and 0.6 mg/kg) in the following borings
    - RA-06SB-02(0-0.5): Mercury at concentration of 1.5 mg/kg
    - RA-06SB-03(0-0.5): Beryllium at concentration of 1.6 mg/kg
    - RA-06SB-04(0-0.5): Mercury at concentration of 0.85 mg/kg
    - RA-06SB-04(02-03): Mercury at concentration of 0.92 mg/kg
    - RA-06SB-05(0-0.5): Mercury at concentration of 0.94 mg/kg

Building 7



Building 7 Summary Table

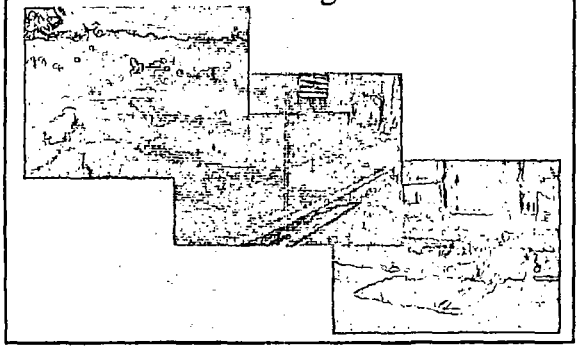
Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level				
		Metals	PAHs	PCBs	TPH	VOCs
Concrete	2	na	na	0*	1*	na
Soil – Oil Stain	3	na	na	na	0	na
Soil – Risk Assessment	44	0	0	1	na	0

* One sample analyzed for each set of compounds

Building 7 Results

- Concrete
  - Samples collected at 0-1" (TPH analysis) and 2-3" (PCB analysis) depths from one location
  - TPH-DRO detected in surface sample only at a concentration of 2000 mg/kg (Soil SL = 200 mg/kg)
- Soils
  - Samples beneath oil stain in building were below Screening Level (200 mg/kg) for TPH
  - Only detection in Risk Assessment samples was 0.34 mg/kg PCB-1254 at RA-07SB-02(0-0.5)

Building 8



Building 8 Summary Table

Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level				
		Metals	PAHs	PCBs	TPH	VOCs
Sediment	2	na	na	na	0	na
Soil – Monitoring Well	1	na	na	na	0	na
Soil – Pipe Trench	21	na	na	na	1	na
Soil – Risk Assessment*	1	0	0	0	0	0
Soil – Risk Assessment	60	0	0	0	na	1

* = One discretionary sample was collected at location RA-08SB-15.

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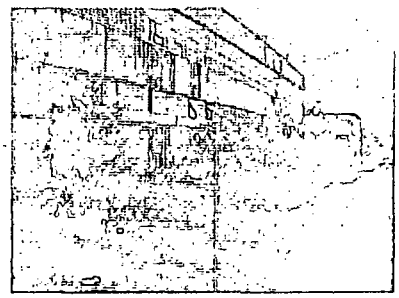
Building 8 Results

- Sediments
  - No detections above Screening Level for TPH
- Soil (Monitoring Well)
  - Additional boring adjacent to monitoring well 08MW-02 did not detect TPH contamination above Screening Level
- Soil (Pipe Trench)
  - One detection of TPH above SL (200 mg/kg) at 08SB-07, concentration was 1065 mg/kg

Building 8 Results

- Soil (Risk Assessment)
  - Discretionary sample collected at RA-08SB-15 did not detect TPH above the Screening Level
  - 1,1-Dichloroethene detected at concentration of 0.17 mg/kg (SL = 0.054 mg/kg) at boring location RA-08SB-05 at a depth of 0 to 0.5 feet

Building 10



Building 10 Summary Table

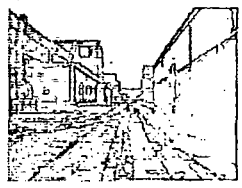
Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level	
		BTEX	TPH
Soil – UST Closure	17	0	0

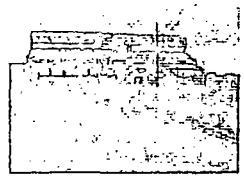
Building 10 Results

- All soil boring samples collected at Building 10 were below Screening Level for BTEX and TPH
- Discretionary samples at deeper borings SRSB-18 and SRSB-19 in this area had detections of TPH above the SL (200 mg/kg) of 550 and 600 mg/kg
- SRSB-16 located northeast of Building 10 had a detection of TPH at a concentration of 530 mg/kg at a depth of 6 to 7 feet

Additional Risk Assessment Areas

- Northeast Parking Area
- Railroads
- Roadways





Additional Risk Assessment Areas Summary Table

Investigation Area - Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level				
		Explosives	Metals	PAHs	PCBs	VOCs
Northeast Parking Area – Soil Boring	24	na	0	0	0	0
Railroads – Soil Boring	33	na	0	0	0	1
Roadways – Soil Boring	84	na	3	0	0	1
Roadways – Soil Boring (Former Building 9 Area)	12	0	0	0	0	0

Northeast Parking Area Results

- Metals
  - No Detections above Screening Levels
- PAHs
  - No Detections above Screening Levels
- PCBs
  - No Detections above Screening Levels
- VOCs
  - No Detections above Screening Levels

Railroads Results

- Metals
  - No Detections above Screening Levels
- PAHs
  - No Detections above Screening Levels
- PCBs
  - No Detections above Screening Levels
- VOCs
  - 1,1-Dichloroethene detected at RA-RRSB-10 (0-0.5')
  - Concentration of 0.075J mg/kg (SL = 0.054 mg/kg)

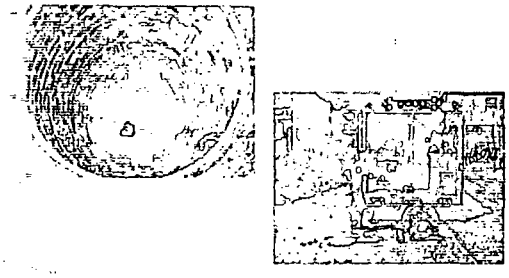
Roadways Results

- Explosives
  - Analyzed only in samples RA-RDSB-13, -13E, -14, and -14E due to proximity to former Building 9
  - No detections above Screening Levels
- Metals
  - Antimony (SL = 31 mg/kg)
    - RA-RDSB-16E (0 to 0.5 feet) at a concentration of 34 mg/kg
  - Beryllium (SL = 1.6 mg/kg)
    - RA-RDSB-06 (4 to 5 feet) at a concentration of 2 mg/kg
    - RA-RDSB-06E (0 to 0.5 feet) at a concentration of 6.7 mg/kg

Roadways Results (cont.)

- PAHs
  - No Detections above Screening Levels
- PCBs
  - No Detections above Screening Levels
- VOCs
  - 1,1-Dichloroethene detected at RA-RDSB-01E (9-10')
  - Concentration of 0.1J mg/kg (SL = 0.054 mg/kg)

Sewer System Survey



Sewer System

- Wastewater Results
- Sediment Results
- Soil Boring Results

Sewer System Summary Table

Sample Type	# of Samples Collected	# of Samples with Detections above Screening Level: Metals	PCBs	SVOCs	TPH	VOCs
Wastewater	10	10	10	7*	0	7
Sediment	5	5	5	2*	5	3
Soil	92	8	0	0	3	0

* Two wastewater and two sediment samples were not analyzed for SVOCs

Sewer Wastewater Results

- Metals
  - Arsenic
    - 10 Detections above Screening Level (SL = 0.045 µg/L)
    - Min: 0.9J µg/L; Mean: 1.7 µg/L; Max: 3.2 µg/L (02WW-02)
  - Cadmium
    - Only detection above SL (5 µg/L) was 19 µg/L at 02WW-02
  - Lead
    - 8 Detections above Screening Level (SL = 15 µg/L)
    - Min: 15 µg/L; Mean: 106 µg/L; Max: 412 µg/L (02WW-01)

Sewer Wastewater Results (Cont.)

- PCBs
  - PCB-1248
    - 10 Detections above Screening Level (SL = 0.034 µg/L)
    - Min: 0.13 µg/L; Mean: 1.65 µg/L; Max: 6.8 µg/L (SRWW-04)
- SVOCs
  - Benzidine
    - Only detection above Screening Level was 2.3 µg/L at SRWW-10 (0.00012 µg/L)
  - Benzo(a)anthracene
    - 7 Detections above Screening Level (SL = 0.0044 µg/L)
    - Min: 0.079 µg/L; Mean: 2.18 µg/L; Max: 9.7 µg/L (SRWW-04)

Sewer Wastewater Results (Cont.)

- SVOCs (cont.)
  - Benzo(a)pyrene
    - 6 Detections above Screening Level (SL = 0.0092 µg/L)
    - Min: 0.13 µg/L; Mean: 2.62 µg/L; Max: 9.2 µg/L (SRWW-04)
  - Benzo(b)fluoranthene
    - 7 Detections above Screening Level (SL = 0.0044 µg/L)
    - Min: 0.11 µg/L; Mean: 2.95 µg/L; Max: 12 µg/L (SRWW-04)
  - Benzo(k)fluoranthene
    - 7 Detections above Screening Level (SL = 0.0044 µg/L)
    - Min: 0.092 µg/L; Mean: 1.64 µg/L; Max: 5.8 µg/L (SRWW-04)

Sewer Wastewater Results (Cont.)

- SVOCs (cont.)
  - Chrysene
    - 7 Detections above Screening Level (SL = 0.0044 µg/L)
    - Min: 0.079 µg/L; Mean: 2.96 µg/L; Max: 13 µg/L (SRWW-04)
  - Dibenz(a,h)anthracene
    - 4 Detections above Screening Level (SL = 0.0044 µg/L)
    - Min: 0.21 µg/L; Mean: 0.73 µg/L; Max: 1.8 µg/L (SRWW-04)
  - Indeno(1,2,3-cd)pyrene
    - 6 Detections above Screening Level (SL = 0.0044 µg/L)
    - Min: 0.08 µg/L; Mean: 2.40 µg/L; Max: 8.8 µg/L (SRWW-04)

Sewer Wastewater Results (Cont.)

- VOCs
  - 1,1,1-Trichloroethane
    - Only detection above Screening Level was 340 µg/L at 02WW-02 (SL = 200 µg/L)
  - 1,1-Dichloroethene
    - 3 Detections above Screening Level (SL = 0.046 µg/L)
    - Min: 0.6J µg/L; Mean: 1.3 µg/L; Max: 2.1 µg/L (SRWW-03)
  - 1,2-Dichloroethane
    - 2 Detections above Screening Level (SL = 0.12 µg/L)
    - Min: 0.4J µg/L; Mean: 0.8 µg/L; Max: 1.2 µg/L (02WW-02)

Sewer Wastewater Results (Cont.)

- VOCs (cont.)
  - 1,4-Dichlorobenzene
    - Only detection above Screening Level was 1.2 µg/L at SRWW-04 (SL = 0.5 µg/L)
  - Carbon Tetrachloride
    - Only detection above Screening Level was 2.1 µg/L at SRWW-06 (SL = 0.17 µg/L)
  - Chloroethane
    - 3 Detections above Screening Level (SL = 4.6 µg/L)
    - Min: 38 µg/L; Mean: 77 µg/L; Max: 150 µg/L (SRWW-02)

Sewer Wastewater Results (Cont.)

- VOCs (cont.)
  - Chloroform
    - Only detection above Screening Level was 0.3J µg/L at SRWW-06 (SL = 0.16 µg/L)
  - Methylene Chloride
    - Only detection above Screening Level was 49 µg/L at 02WW-02 (SL = 4.3 µg/L)
  - Trichloroethene (TCE)
    - Only detection above Screening Level was 10 µg/L at SRWW-11 (SL = 1.6 µg/L)

Sewer Wastewater Results (Cont.)

- VOCs (cont.)
  - Vinyl Chloride
    - Only detection above Screening Level was 0.5J µg/L at 02WW-02 (SL = 0.041 µg/L)

Sewer Sediment Results

- Metals
  - Antimony
    - 4 Detections above Screening Level (Soil SL = 31 mg/kg)
    - Min: 39 mg/kg; Mean: 43.8 mg/kg; Max: 55 mg/kg (SRSD-03)
  - Arsenic
    - 4 Detections above Screening Level (Soil SL = 21.4 mg/kg)
    - Min: 3.2 mg/kg; Mean: 21.3 mg/kg; Max: 31 mg/kg (02SD-01)
  - Chromium
    - 3 Detections above Screening Level (Soil SL = 210 mg/kg)
    - Min: 215 mg/kg; Mean: 264 mg/kg; Max: 360 mg/kg (SRSD-02)

Sewer Sediment Results (cont.)

- Metals (cont.)
  - Copper
    - Only detection above Screening Level was 1290 mg/kg at SRSD-03 (Soil SL = 1100 mg/kg)
  - Lead
    - Only detection above Screening Level was 3660 mg/kg at SRSD-04 (Soil SL = 1038 mg/kg)
  - Mercury
    - Only detection above Screening Level was 5.24 mg/kg at SRSD-02 (Soil SL = 0.6 mg/kg)

Sewer Sediment Results (cont.)

- PCBs
  - PCB-1248
    - 5 Detections above Screening Level (Soil SL = 0.22 mg/kg)
    - Min: 3.2 mg/kg; Mean: 18.8 mg/kg; Max: 48 mg/kg (SRSD-02)
  - PCB-1260
    - 3 Detections above Screening Level (Soil SL = 0.22 mg/kg)
    - Min: 0.34J mg/kg; Mean: 1.18 mg/kg; Max: 1.8 mg/kg (02SD-01)
  - Total PCBs
    - Min: 3.54 mg/kg; Mean: 19.6 mg/kg; Max: 49.4 mg/kg (SRSD-02)

Sewer Sediment Results (cont.)

- SVOCs
  - Di-n-octylphthalate
    - Only detection above Screening Level was 2J mg/kg at SRSD-02 (Soil SL = 0.3 mg/kg)
  - Acenaphthylene
    - Only detection above Screening Level was 0.59J mg/kg at SRSD-04 (Soil SL = 0.31 mg/kg)
  - Benzo(a)anthracene
    - Only detection above Screening Level was 80 mg/kg at SRSD-04 (Soil SL = 7.24 mg/kg)

Sewer Sediment Results (cont.)

- SVOCs (cont.)
  - Benzo(a)pyrene
    - Only detection above Screening Level was 66 mg/kg at SRSD-04 (Soil SL = 4.10 mg/kg)
  - Benzo(b)fluoranthene
    - Only detection above Screening Level was 100 mg/kg at SRSD-04 (Soil SL = 4.90 mg/kg)
  - Benzo(g,h,i)perylene
    - Only detection above Screening Level was 44 mg/kg at SRSD-04 (Soil SL = 2.46 mg/kg)

Sewer Sediment Results (cont.)

- SVOCs (cont.)
  - Benzo(k)fluoranthene
    - Only detection above Screening Level was 40 mg/kg at SRSD-04 (Soil SL = 6.2 mg/kg)
  - Chrysene
    - Only detection above Screening Level was 88 mg/kg at SRSD-04 (Soil SL = 36 mg/kg)
  - Dibenz(a,h)anthracene
    - Only detection above Screening Level was 11 mg/kg at SRSD-04 (Soil SL = 1.52 mg/kg)

Sewer Sediment Results (cont.)

- SVOCs (cont.)
  - Indeno(1,2,3-cd)pyrene
    - Only detection above Screening Level was 37 mg/kg at SRSD-04 (Soil SL = 1.99 mg/kg)
  - Phenanthrene
    - Only detection above Screening Level was 190 mg/kg at SRSD-04 (Soil SL = 15.2 mg/kg)
- TPH
  - 5 Detections above Screening Level (Soil SL = 200 mg/kg)
  - Min: 6,340 mg/kg (SRSD-04); Mean: 16,806 mg/kg; Max: 37,060 mg/kg (SRSD-02)

Sewer Sediment Results (cont.)

- VOCs
  - 1,1,1-Trichloroethane
    - Only detection above Screening Level was 3900 mg/kg at 02SD-02 (Soil SL = 630 mg/kg)
  - 1,1-Dichloroethane
    - Only detection above Screening Level was 640 mg/kg at 02SD-02 (Soil SL = 590 mg/kg)
  - 1,1-Dichloroethene
    - Only detection above Screening Level was 0.083 mg/kg at SRSD-02 (Soil SL = 0.054 mg/kg)

Sewer Sediment Results (cont.)

- VOCs (cont.)
  - 1,2-Dichloroethane
    - Only detection above Screening Level was 0.98 mg/kg at 02SD-02 (Soil SL = 0.35 mg/kg)
  - Chloroethane
    - 2 Detections above Screening Level (Soil SL = 3 mg/kg)
    - Min: 3 mg/kg (02SD-01); Max: 36 mg/kg (SRSD-02)
  - Chloroform
    - Only detection above Screening Level was 0.39 mg/kg at 02SD-02 (Soil SL = 0.24 mg/kg)

Sewer Sediment Results (cont.)

- VOCs (cont.)
  - Methylene Chloride
    - Only detection above Screening Level was 22J mg/kg at 02SD-02 (Soil SL = 8.9 mg/kg)

Sewer Soil Boring Results

- Metals
  - Beryllium
    - 8 Detections above Screening Level (SL = 1.6 mg/kg)
    - Min: 1.6 mg/kg; Mean: 2.4 mg/kg: Max: 3.6 mg/kg
- TPH
  - 3 Detections above Screening Level (SL = 200 mg/kg)
  - All in vicinity of Building 10, but below those samples
  - Min: 530 mg/kg; Mean: 560 mg/kg: Max: 600 mg/kg

Groundwater

- No water bearing units identified during installation of four new wells (03MW-01, 08MW-01,-02,-03)
- New 4 wells sampled using disposable hand bailers approximately one week after development
- Existing 9 wells purged dry under low flow pumping, samples collected the following day using disposable hand bailers
- No recorded precipitation for 28 days prior to sampling, rain every day during sampling
- Turbidity ranges in wells
  - New wells: 1.5 to 2.8 NTU
  - Existing wells: 2.3 to 12.0 NTU with outliers at 52.4 (SWMW-03) and >1000 NTU (SWMW-07)

Monitoring Well Results Summary Table

Sample Type	# of Wells Sampled	# of Samples with Detections above Screening Level									
		Explosives	Metals	Nitrate	Phosphorus	PCBs	Pesticides	SVOCs	VOCs	Chloride*	Fluoride*
Fire Hydrant	1	na	na	na	na	na	na	na	na	1	1
Building 2	1	0	1	0	0	0	0	1	1	na	na
Building 3	1	0	1	0	0	0	0	1	0	1	1
Building 8	3	0	3	0	0	0	0	3	0	2*	2*
Building 10	1	0	1	0	0	0	0	1	0	na	na
Site-Wide	7	0	7	0	0	0	0	7	0	na	na

* Screening Levels for Chloride and Fluoride were not established (all detections are reported).
* Only two of the three wells in this area were tested for Chloride and Fluoride.

Monitoring Well Results

- Metals
  - Arsenic
    - Detected in all thirteen monitoring wells on site
    - Screening Level (SL) = 0.045 µg/L
    - Concentrations ranged from 0.3J to 7.8 µg/L
  - Lead
    - Detected only in well SWMW-07
    - Concentration was 44 µg/L (SL = 15 µg/L)

Monitoring Well Results (cont.)

- SVOCs
  - 1,2-Diphenylhydrazine (1 Detection)
    - Concentration: 0.35J µg/L (SL = 0.084 µg/L)
  - Benzo(a)anthracene (10 Detections)
    - Range: 0.0044 - 0.066 µg/L (SL = 0.0044 µg/L)
  - Benzo(a)pyrene (10 Detections)
    - Range: 0.01 - 0.092 µg/L (SL = 0.0092 µg/L)
  - Benzo(b)fluoranthrene (12 Detections)
    - Range: 0.0054 - 0.099 µg/L (SL = 0.0044 µg/L)

Monitoring Well Results (cont.)

- SVOCs (cont.)
  - Benzo(k)fluoranthene (11 Detections)
    - Range: 0.0044 - 0.19 µg/L (SL = 0.0044 µg/L)
  - Chrysene (11 Detections)
    - Range: 0.0061 - 0.13 µg/L (SL = 0.0044 µg/L)
  - Dibenz(a,h)anthracene (5 Detections)
    - Range: 0.0047 - 0.077 µg/L (SL = 0.0044 µg/L)
  - Indeno(1,2,3-cd)pyrene (5 Detections)
    - Range: 0.0066 - 0.11 µg/L (SL = 0.0044 µg/L)

Monitoring Well Results (cont.)

- VOCs
  - Four compounds detected above SL at only one monitoring well, 02MW-01
    - 1,1-Dichloroethene, 34 µg/L (SL = 0.046 µg/L)
    - 1,2-Dichloroethane, 0.4 µg/L (SL = 0.12 µg/L)
    - Carbon Tetrachloride, 1 µg/L (SL = 0.17 µg/L)
    - Chloroform, 10 µg/L (SL = 0.16 µg/L)

Monitoring Well Results (cont.)

- Indicator Parameters
  - Chloride
    - Fire Hydrant concentration was 27 mg/L
    - Well concentrations were 5, 7.2 and 95 mg/L
  - Fluoride
    - Fire Hydrant concentration was 1 mg/L
    - Well concentrations were 0.28, 0.33 and 0.44 mg/L
  - Residual Chlorine
    - Fire Hydrant concentration was 1 mg/L
    - Well concentrations were 0 to 0.5 mg/L

Baseline Human Health Risk Assessment (HHRA)

- The goal of a Baseline HHRA is to estimate potential risks to current or future receptor populations at a site, assuming that current contamination is not remediated.
- For SLAAP, the HHRA is being developed to support potential property transfer. While the most likely future use of the site is industrial or commercial, additional less likely scenarios are also evaluated. Results of the HHRA will most likely be used to support a "no action" determination, deed restriction, site cleanup, or some combination thereof.

Baseline HHRA (cont.)

- Primary medium of concern for the HHRA is soil. Groundwater is not used in the area, and exposure potential is limited. Buildings are evaluated separately using existing standards.
- Scenarios to be evaluated quantitatively in the HHRA:
  - Industrial/Commercial worker (surface soil)
  - Excavation worker (subsurface soil)
  - Hypothetical resident (surface soil)

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Baseline HHRA (cont.)

- Areas of Concern (AOCs)
  - Although most of the site is currently paved and/or covered with buildings, we do not know which, if any buildings are to be removed in the future.
  - Individual building footprints
  - Areas surrounding buildings

Baseline HHRA (cont.)

- Chemicals of Potential Concern (COPCs)
  - Focuses on those classes of compounds known or suspected to be present, based on past site history and results of initial EBS.
  - Site data are screened against conservative screening criteria (CALM and Region IX PRGs) to identify COPCs for evaluation in the HHRA.

Baseline HHRA (cont.)

- Chemicals of Potential Concern (cont.)
  - PCBs and PAHs appear to be the primary COPCs, although other chemicals (pesticides, metals, etc.) are found sporadically in some AOCs.
  - Dioxin is a big unknown. Sampling in Building 2 show the presence throughout the building and in soils (surface and subsurface). Dioxin has not been characterized in other areas.

Baseline HHRA (cont.)

- Type of risk analysis to be performed
  - Reasonable Maximum Exposure (RME) and Central Tendency Exposure (CTE). RME provides an estimate of upperbound risks among most highly exposed individuals, CTE estimates risks to the "average" receptor.
  - "Hotspot" analysis (data from known areas of contamination) and representative exposure (data averaged across the building footprint).

Baseline HHRA (cont.)

- Status of HHRA
  - Data have been collected, validated and entered into database (except for supplemental samples).
  - COPC screening is the next step.